

REMARKS

Review and reconsideration on the merits are requested.

The Rejection

There is only one rejection.

Claims 1-8, all pending claims, were rejected under 35 U.S.C. § 103(a) as being unpatentable over WO 02/083966A1 Beguinot et al (Beguinot).

The rejection of these claims is respectfully traversed.

The Examiner's position is set forth in the Action and will not be repeated here except as necessary to an understanding of Applicants' traversal which is now presented.

Traversal

The present invention is directed to suppressing dimensional change which occurs on tempering a steel. The suppression is obtained by forming an Ni-Al intermetallic compound which causes what Applicants call a contraction change of dimension and cancels what Applicants call the dilatation (expansion of the steel).

The advantages obtained in accordance with the present invention are completely different from those of Beguinot. While Beguinot discloses an extremely wide compositional range, the advantages of the present invention are obtained only following the narrow limits of the claims of the present application.

Applicants use "consistently essentially of" instead of "including" to define the composition of the steel. It is to be noted, however, that the balance of the steel is composed of iron and unavoidable impurities, such as gas which is present.

Beguinot fails to disclose or suggest the objective of the present invention, does not suggest the compositional limits of the claims of the present application as the Beguinot composition is based on a different technical concept from that of the present invention and the composition of the present invention as claimed results in different advantages from the composition of Beguinot. Accordingly, Applicants respectfully submit that one of ordinary skill in the art would not be led to the present invention nor find the claims as framed obvious over Beguinot.

As a starting point, Beguinot is silent on the effect of the present invention of “excellent in characteristics of suppressing dimensional change”. Beguinot simply discloses that “the structure is most homogenous possible in great thickness after hardening”.¹ The “homogenous structure” of Beguinot means that Beguinot intends to reduce coarse carbides and to disperse fine carbides, whereby toughness is improved while keeping high hardness. Applicants advise that this occurs in the French text at page 2, lines 8 to 10. Applicants have reviewed the published French text of Beguinot from WIPO, and largely provide the following comments based on the French text.

Beguinot discloses, as prior art, that carbon and chromium are reduced, respectively, to 1% and 8% to reduce coarse carbides, and 2.5% of Mo is added to keep high hardness by precipitating hard carbides. French text, page 2, lines 1-7. As shown in Table 1 of Beguinot, heat (Coulee) 1, having the composition proposed by Beguinot has substantially the same content of carbon and chromium as heat 2 which is a prior art heat. Thus, the example in the Table in Beguinot has a composition in which Ti, Zr and N are adjusted on the basis of the composition of

¹ Applicants advise that this occurs at page 1, lines 19-21 in the French text published by WIPO.

the prior art that contains about 1% of carbon, about 8% of chromium and about 2.5% of molybdenum. This can be seen from the statements at pages 1 and 2 in Beguinot.

In distinction to Beguinot, as stated in the paragraph bridging pages 2/3 of the present application, the objective of the present invention *is to suppress expansion in tempering a steel*. The expansion is caused by a release of residual stress introduced in hardening. The release of the residual stress (or decomposition of austenite) is facilitated by Mo. Mo is added to a steel in the prior art, such as Beguinot, to obtain a secondary hardening by way of forming carbides. Thus, the amount of Mo must be limited to not higher than 1.7% in the formula Mo+W/2 in the present invention.

Further, since the present invention has the further object of improving machinability, for example, see the bottom of page 6 of the specification, initially carbides are reduced. In order to compensate for the reduction in hardness due to the reduction in the carbides, not less than 0.3% of Ni and not less than 0.1% of Al are added to the steel. This is because adding a substantial amount of Mo cannot be practiced in the present invention. The added Ni and Al form an Ni-Al intermetallic compound to provide the steel with hardness, as well as providing an effect of causing a contractional change in dimensions, canceling the above described dilatation.

Although claim 1 of Beguinot recites that the steel contains 1 to 4% of Mo+W/2, Beguinot does not disclose or suggest limiting the content thereof to not more than 1.7%. The reason for this is that Beguinot fails to disclose or deal with the object of suppressing dilatation of the steel after hardening and tempering. The Examiner is requested to note in this regard that the Example in Beguinot involves the use 2.5% of Mo.

Although Beguinot defines Si+ Al as ≤ 2 , these elements are merely added for the purpose of deoxidation. See page 5, lines 14-18 in Beguinot. Thus, one of ordinary skill in the

art would want the content of these two materials to be as low as possible. As a consequence, this limitation is Beguinot appears to be simply a broad, hypothetical range, and Si and Al are not positively added for any effect other than deoxidation. Table 1 in Beguinot shows that heat 1 contains 0.03% Al. As a consequence, Applicants respectfully submit that one of ordinary skill in the art would not contemplate increasing the amount of Al to “0.1 to 0.7%” as claimed in the present claims. This is certainly the case following the teaching of Beguinot where one could successfully reduce the amount to 0.03%. Thus, Applicants respectfully submit that Beguinot does not suggest the range of Al should or must be “0.1 to 0.7%”.

Although Beguinot discloses that not more than 0.3% of sulfur can be added to the steel in order to improve machinability (page 5, lines 29 and 30), in Beguinot sulfur would be considered an impurity because heat 1 in Table 1 of Beguinot does not contain sulfur. Further, sulfur is generally an impurity in the technical art of tool steels. It would not be practical or understood by one of ordinary skill in the art that one should add 0.01 to 0.12% sulfur. The present invention has as an object obtaining a machinable steel, and this is the reason that sulfur is added in the above range.

Referring now specifically to claim 1 of the present application, it now recites that $\text{Ni/Al} = 1$ to 3.7 (former claim 2). Aluminum and nickel are coupled to form an Ni-Al intermetallic compound in the present invention. If the amounts of nickel and aluminum are adjusted so as to satisfy the relationship of $\text{Ni/Al} = 1$ to 3.7, the amounts of nickel and aluminum in the matrix which do not form an intermetallic compound can be adjusted. Thus, the amount of nickel in the matrix can be reduced, particularly after the intermetallic compound has been precipitated, so that the steel can keep good machinability after heat treatment (aging), and undergo secondary hardening through precipitation.

Beguinot et al fail to disclose that a Ni-Al intermetallic compound is formed, and thus cannot teach or suggest to one of ordinary skill in the art the claimed relationship between nickel and aluminum.

Considering all of the above, withdrawal of the rejection and allowance is requested.

Reporting Substance of Interview

A telephone interview was conducted concerning this application on October 16, 2008.

Three issues were discussed.

(1) Would the Examiner consider commercial success?

(2) If the claims were amended to recite “wherein the steel includes solid-solute carbon of about 0.53%” and/or “whereby nickel and aluminum forms an intermetallic compound through quenching and tempering”, would the Examiner take an inherency position on these limits.

If Applicants were to add claims 2, a method for suppressing dimensional change of a cold die steel, would that lead to a restriction requirement?

The results are set forth below.

(1) On commercial success.

The Examiner would consider a DECLARATION attempting to prove commercial success.

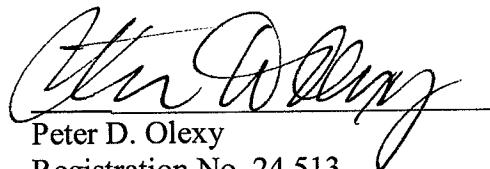
This would require an RCE, however. The Examiner was told that probably the commercial success would not be shown over the complete claim scope since the product or products involved were probably fairly specific. The Examiner said, reasonably enough, that she would need to see exactly what the nature of the product was and where the product identity fell within the ranges of the present application.

(2) With respect to cold die steel with "wherein the steel includes solid-solute carbon of about 0.53%" and/or "whereby nickel and aluminum forms an intermetallic compound through quenching and tempering", here the Examiner said that whether she would take an inherency position or not would depend upon how close the process used in the present application was to the process used in the Beguinot reference. If there was significant overlap, with the prior art, the Examiner believed she would take an inherency position. Such claim limits would require further searching and thus an RCE.

(3) With respect to adding method claims, the Examiner said that most likely there would be a restriction requirement posed if cold die steel claims and method claims were presented.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,



Peter D. Olexy
Registration No. 24,513

SUGHRUE MION, PLLC
Telephone: (202) 293-7060
Facsimile: (202) 293-7860

WASHINGTON OFFICE
23373
CUSTOMER NUMBER

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